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ABSTRACT

For 10 years or more, teachers at the City Colleges of Chicago have used mastery learning, a teaching technique that focuses on the use of a corrective/feedback process to improve student learning. Early studies of mastery learning at the colleges comparing student grades in mastery learning classes to control classes in which these techniques were not used demonstrated a positive effect, with significantly more students earning credit grades in mastery classes than in comparable non-mastery classes. A recent study sought to determine whether differences in the amount of exposure to mastery learning methods could be related to performance. The colleges' computer-based student recordkeeping system provided information on students' grades and the instructional method used in their courses. A comparison of the earned credit ratios (ECR's) of students taking no mastery learning classes, one mastery learning class, and two mastery learning classes revealed: (1) in eight of nine comparisons, mastery learning sections had higher ECR's than comparable non-mastery learning sections; (2) students who took no mastery learning classes had an overall ECR of 64%, while the ECR of those taking one mastery learning class was 59% and that of students taking two mastery learning classes was 66%; and (3) there were no significant differences in the average difficulty of the non-mastery learning classes taken by mastery learning students and other students. (LAL)

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The Effect of Mastery Learning on Student Achievement

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Mastery Learning is a teaching technique that focuses on the use of a corrective/feedback process to improve student learning. Students take frequent "formative tests" to measure their learning progress that are followed by corrective activities designed to remedy specific difficulties shown by the test results. Many noted educators have written on the theory and practice of mastery learning (Block & Anderson, 1975; Bloom, 1976); in addition many practitioners have prepared comprehensive workbooks and other publications dealing with mastery learning applications.

Teachers at the City Colleges of Chicago have used mastery learning for ten or more years. What began as an experimental project on one campus developed into an institutionalized program affecting several hundred teachers and many thousands of students on all of the City Colleges' campuses. Mastery learning techniques and methods continue to be used by many individual instructors.

The purpose of this paper is present new evaluation results of the City Colleges' mastery learning program. This current mastery learning evaluation takes advantage of the City Colleges' system-wide computerized data base.

Early studies of mastery learning at the City Colleges relied on especially collected student achievement data. Evaluators compared student grades in mastery learning to grades in control classes taught by the same teachers (Guskey & Monsaas, 1979; Jones, et al., 1975). More recent evaluation studies have compared mastery classes to non-mastery classes of the same course without controlling for teacher (Caponigri, Matheis & Schumann, 1981). All of these studies have demonstrated a positive effect of mastery learning with significantly more students earning credit (A, B, C or D grades) in mastery classes than in comparable non-mastery classes. We felt that a change in evaluation techniques might shed new light on how mastery has its effects.

In our analysis we were more concerned with discovering the effects of mastery learning on students as individuals rather than as parts of a class average. We wished to determine whether differences in the amount of exposure to to mastery learning methods could be related to performance. That is, we sought to examine differences among students enrolled in no, one or two mastery learning courses during a single semester. Our hypothesis was that greater exposure to mastery methods should result in better student performance.

Data and Methods

The City Colleges' computer-base student record keeping system served as the primary data source for this investigation. These records are classified by student identification number and contain registration data and final grade dispositions (A, B, C, D, F, incomplete or withdrawal) for every student in the City Colleges. An independent list identified courses taught with mastery learning procedures. A matching process marked every course of every full-time student in Fall 1981 as either mastery or non-mastery.

The basic unit of course grades are aggregated in several ways in this analysis. In order to answer the major question of this research about achievement differences among students with no, one or two mastery learning classes, we created three groups containing all full-time students corresponding to the number of mastery learning classes. In other preliminary or subsequent analyses, the final grades are aggregated by class or course, rather than by student. The dependent variable in all cases is the earned credit rate (ECR -- percent of all students receiving an A, B, C or D grade).

Results

In order to confirm the results of previous evaluations of mastery learning at the City Colleges we selected one college with a large number of ML classes, retaining only those courses where at least one section was taught with ML. This left a total of 14 ML sections taught in 9 different courses. We compared the median earned credit rate in the ML sections to the non-ML sections in the same course. Table 1 shows that in 8 of the 9 comparisons, the mastery sections had higher median ECRs than the comparable non-mastery sections.

The major analysis in this study compares students with no, one or two mastery learning classes at the five colleges at which mastery learning was used in Fall 1981 to find whether student performance improves with more exposure to mastery methods. Table 2 shows that students who took no ML classes had an overall ECR of 64%, students with one ML class had and ECR of 59%, and students with two mastery classes had an overall ECR of 66%. These data are partially consistent with our expectation that greater exposure to mastery will improve student performance. Students with two mastery courses have the highest ECR of all, yet students enrolled in one ML course do less well than students who took no ML classes.

Table 2 also presents separate ECRs for mastery and non-mastery classes taken by students who took one or two mastery classes. The ECRs are consistently higher in the non-ML classes than the ML classes for the ML students. These data are not consistent with our notion that mastery learning improves performance, whereas the first analysis, presented in Table 1, does confirm previous evaluations of the positive effect of mastery.

Interpretations

How do we account for these discrepancies? Although students with two ML classes have higher ECRs than other students, students with one ML class do less well than students with no ML classes. Also, the ECRs are greater in the non-mastery classes than in mastery classes.

Contrary to the earlier studies and our own findings for one college, our analysis of the various groupings of students did not hold either course or teacher constant. It appears that our discrepant findings on the effects of mastery can be attributed to the fact that mastery techniques are used in relatively more difficult classes.

To test this hypothesis, we again examined the 9 courses shown in Table 1 that had at least one ML and one non-ML section. We determined the median average earned credit rate

in these 9 courses (after eliminating the ML sections) and compared this to the median earned credit rate in all of the other courses at the same college, all of which had no sections using mastery learning. The median of the 9 courses that used mastery was 59.0 whereas the median of the distribution in the 138 courses that used no mastery was 66.7. Although this is a very crude test of the difference between these courses, the hypothesis is supported that the courses that used mastery were more difficult, on the average, than were other courses.

These results imply that if we had controlled for course in Table 2, the mastery sections would have higher ECRs than the non-ML sections and the likely ordering in terms of increasing performance would be students with no, one and two ML classes. Thus it appears that greater exposure to mastery leads to better performance.

To further verify that ML students improve their performance through the use of skills learned in ML classes, we sought to determine whether the better grades of students in their ML and non-ML classes could be attributed to their finding "easy" non-ML sections (in expectation of a greater number of requirements in ML classes). We examined the performance in non-ML classes of students with two ML classes. Table 2 shows an ECR of 68% for these classes for this group. We also chose to examine this group for the purpose

of determining whether the data are consistent with the hypothesis that skills learned in ML classes are immediately transferable to non-ML classes.

The analysis showed that students with two ML classes perform better, on the average, than their classmates in non-ML classes. On the other hand, there were no significant differences in average difficulty between the non-ML classes of mastery students and the classes of other students.

These results imply that the better performance of students with more ML classes cannot be attributed to enrollment in easier courses. The data also suggest that skills learned in ML classes may be immediately transferrable to non-ML classes.

Summary

This analysis suggests that greater exposure to ML methods is related to improved performance in both ML and non-ML classes. Comparison of ML and non-ML sections of the same course suggested that evidence of higher absolute performance in non-ML classes was attributable to ML techniques being used in more difficult classes.

Other research at the City Colleges also points directly to the effectiveness of the feedback/corrective

process in teaching and learning. In a study in which we interviewed very effective teachers at the City Colleges of Chicago (Guskey & Easton, 1983) we discovered that our outstanding teachers employ a variety of feedback and corrective techniques and processes in their teaching, regardless of whether they call themselves mastery learning teachers or not. Among the correctives that the teachers use are computer aided instruction (PLATO), audio-visual materials, tutors, and individualized conferences with students.

Not only does our research indicate the effectiveness of feedback and correctives, but a recent review of the research on this topic (Lysakowski & Walberg, 1983) shows a dramatic and significant effect due to enhanced feedback and correctives. It is our belief that mastery learning is a convenient and practical means of increasing the use of feedback and correctives in the average classroom.

Mastery learning should not be considered a set of rote or inflexible procedures, but rather a set of principles of teaching and learning that are means to the educational goals of higher student affect, confidence, achievement and retention. Teachers can easily adapt their quizzes, homeworks and practice exercises to provide students with the necessary feedback preparatory to corrective activities. The feedback/corrective cycle provides students with evidence about their learning and an opportunity to relearn the ideas

and concepts they have not understood, before proceeding to more advanced material. This aspect of teaching is one of the most powerful means of increasing student outcome that can be readily undertaken by any teacher in any field.

REFERENCES

Block, J.H. (Ed) Mastery learning theory and practice. New York. Holt, Rinehart and Winston, Inc., 1971.

Block, J.H. and Anderson, L.W. Mastery learning in classroom instruction. New York. MacMillan Publishing Co., Inc., 1975.

Bloom, B.S. Learning for mastery. UCLA Evaluation Comment, 1968, 1 (2).

Bloom, B.S. Human characteristics and school learning. New York: McGraw-Hill Book Company, 1976.

Caponigri, R.S., Matheis, M. and Schumann, M. The impact of mastery learning on performance and attrition. Paper presented at the annual meeting of the American Educational Research Association, 1981.

Guskey, T.R. & Easton, J.Q. The characteristics of very effective teachers in urban junior colleges. Community/ Junior College Quarterly, 1983, 7, 265-274.

Guskey, T.R. and Monsaas, J.A. Mastery learning: A model for academic success in urban junior colleges. Research in Higher Education, 1979, 11 (3), 263-274.

Lysakowsi, R.S. & Walberg, H.J. Instructional effect of cues, participation and corrective feedback: A quantitative synthesis. American Educational Research Journal, 1982, 559-578.

Table 1. Comparison of Earned Credit Rates in Mastery and Non-Mastery Sections at One College

Median ECR in Mastery	Median ECR in non-Mastery
45.5 (1)*	45.0 (1)*
82.4 (1)	58.3 (1)
77.4 (1)	57.9 (3)
42.1 (3)	53.5 (6)
73.7 (1)	72.4 (20)
62.2 (2)	40.6 (5)
72.2 (1)	61.8 (2)
77.8 (1)	76.5 (2)
71.1 (3)	67.2 (2)

*Number of sections

Source: City Colleges of Chicago, Fall, 1981

Table 2. Earned Credit Rates for Students with No, One or Two Mastery Learning Classes in Both Mastery and Non-Mastery Classes at Five Colleges

	Overall ECR	ECR in ML classes	ECR in non-ML classes
Students with no ML classes (n=11,163)	64%	N/A	64%
Students with ML classes (n=2,094)	61%	58%	61%
Students with 1 ML class (n=1,854)	59%	58%	60%
Students with 2 ML classes (n=230)	66%	60%	68%

Source: City Colleges of Chicago, Fall,1981

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